5-port 10/100Base-TX Industrial Switch

(314500)

User's Guide

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FCC WARNING

This equipment has been tested and found to comply with the limits for class A device, pursuant to part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at the user's own expense.

CE

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Take special note to read and understand all content giving in the warning boxes

Warning

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ABOUT THIS GUIDE

The 314500 Industrial Series Switch is a hardened, 5-port Ethernet Switch with redundant DC power inputs to provide a reliable and economical solution for your industrial Ethernet environment. With its dry contact smart alarm, the 314500 issues an alarm function on the factory floor in the event of any malfunction. The 314500 has a wide operating temperature range, from 0 to 70°C, and is designed to sustain higher than normal degrees of vibration and shock, making is suitable and safe for harsh industrial environments.

This manual discusses how to install the 314500 Industrial Fast Ethernet Switch.

Terms/Usage

In this guide, the term "**Switch**" (first letter upper case) refers to the 314500 Industrial Fast Ethernet Switch, and "**switch**" (first letter lower case) generically refers to all other Ethernet switches.

INTRODUCTION

This chapter describes the features of the Switch and some background information about Ethernet/Fast Ethernet switching technology.

Industrial Ethernet Technology

The growing importance of Ethernet has extended to the factory floor and industrial environments before it has become too harsh for typical commercial grade networking equipment. VOLKTEK has created the Industrial Series of Switches and interconnect devices specifically for the purpose of extending Ethernet to the factory floor and industrial environments. All of our Industrial Series devices are delivered in a rugged, hardened case and with components able to withstand a high degree of vibration and shock and temperatures as high as 70°C. Not an ordinary office switch by any means. The 314-500 is engineered and designed especially for the harsh, industrial type environments commonly encountered in heavy industry. With its redundant DC power inputs and high performance components, the 314500 is perfectly suited for an industrial Ethernet deployment.

Switching Technology

Another approach to pushing beyond the limits of Ethernet technology is the development of switching technology. A switch bridge Ethernet packets at the MAC address level of the Ethernet protocol transmitting among connected Ethernet or Fast Ethernet LAN segments.

Switching is a cost-effective way of increasing the total network capacity available to users on a local area network. A switch increases capacity and decreases network loading by dividing a local area network into different *segments*, which don't compete with each other for network transmission capacity.

Features

The Switch was designed for easy installation and high performance in an industrial environment where vibration, shock, heat, and RF interference may be commonplace.

The Switch, with its small, compact size, was specifically designed for easy DIN rail mounting and can be installed where space is limited.

The Switch is ideal for deployment with multiple high-speed servers for shared bandwidth 10Mbps or 100Mbps workgroups. With the highest bandwidth 200Mbps (100Mbps full duplex mode), any port can provide workstations with a congestion-free data pipe for simultaneous access to the server.

The Switch is expandable by cascading two or more switches together in a 'daisy-chain' fashion. As all ports support 200Mbps, the Switch can be cascaded from any port and to any number of switches.

The Switch combines dynamic memory allocation with store-and-forward switching to ensure that the buffer is effectively allocated for each port, while controlling the data flow between the transmit and receive nodes to guarantee against all possible packet loss.

The Switch is an unmanaged 10/100Mbps Fast Ethernet Switch that offers solutions in accelerating small Ethernet workgroup

bandwidth. Other key features are:

- Five (5) 10/100Base-TX
- Rugged, hardened IP30 Case
- Vibration/Shock operational
- Power terminal block
- Wide voltage range: 9-48V
- DIP Switch to enable or disable alarm functions
- Power input polarity protection function
- Under power and over power detection function
- Wide operating temperature: 0°C - 70°C
- Store and forwarding
- Auto-negotiation at all copper ports

314500 INDUSTRIAL SWITCH UNPACKING AND SETUP

This section and the following sections explain the setup and installation of the VOLKTEK 314500 Industrial Switch.

Unpacking

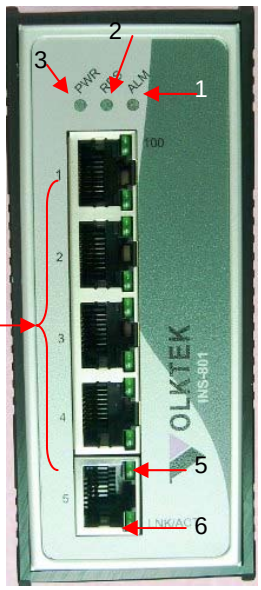
Open the box of the Switch and carefully unpack it. The box should contain the following items:

- ✓ *One 314500 5-port 10/100M Industrial Fast Ethernet Switch*
- ✓ *One DIN rail bracket*
- ✓ *Protective caps for unused ports*
- ✓ *Quick Installation Guide*
- ✓ *This User's Guide CD*

If any item is found missing or damaged, please contact your local reseller for replacement.

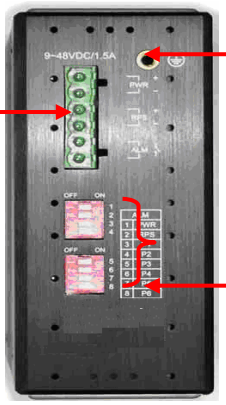
Layout of the 314500

Front View of Switch



1. Alarm LED
2. Redundant Power LED
3. Primary Power LED
4. TX ports (5)
5. TX port 100Mbps LED
6. TX port LNK/ACT LED

TOP View of Switch



Terminal block for power input (PWR/RPS), and alarm dry contact

Grounding Screw

DIP Switches

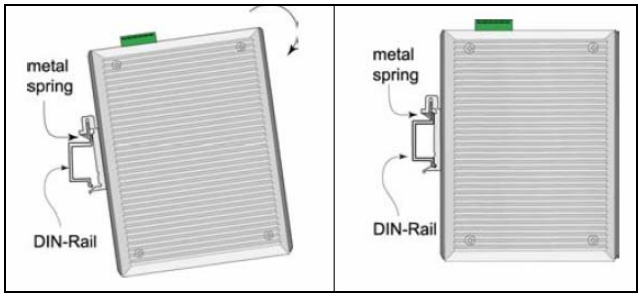
Back View of Switch

Din Rail Bracket

Screws

DIN Rail Mounting of the 314500

The aluminum DIN Rail attachment plate should already be affixed to the back panel of the Switch. If you need to attach the DIN Rail plate, assure that the stiff metal spring is situated towards the top. Attaching the Switch to the DIN rail is easy, just align, and attach the top rail, then press down and snap forward the Switch to snap in the bottom rail, as shown in the figures below.



The setup of the Switch can be performed using the following steps:

- The surface must support at least 1.0 Kg for the Switch.
- The power outlet should be within 1.82 meters (6 feet) of the Switch.
- Visually inspect the DC power jack and make sure

that it is fully secured to the power adapter.

- Make sure that there is proper heat dissipation from and adequate ventilation around the Switch. Do not place heavy objects on the Switch.

Grounding 314500 Industrial Switch will help eliminate the effects of noise due to electromagnetic interference (EMI). Always run the ground connection from the ground screw to the grounding surface prior to connecting DC power.

Redundant Power Inputs

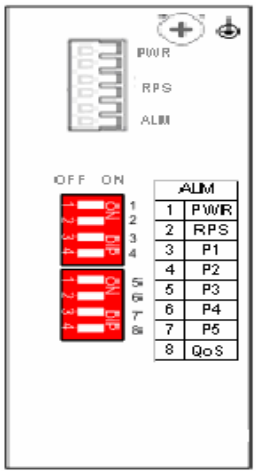
Both primary and redundant power inputs can be connected simultaneously to live DC power sources. If one power source fails, the other live source acts as a backup, and automatically supplies the Switch's power needs.

Configuring DC power Inputs

Configure DC power to the Terminal Block Receptor as under.

DC Powered Switch: Power is supplied through an external DC power source. Check the technical specification section for information about the DC power input voltage.

Since the switch does not include a power switch, plugging its power adapter into a power outlet will immediately power it on.



The plastic green colored contact power block (shown in the diagram to the left) is composed of six contacts and can be inserted and removed easily by hand to connect to the six pin terminal block receptor (male contacts located on the body of the Switch). The top two contacts (PWR) are designated for the primary DC input, while the middle two contacts (RPS) are for redundant DC input. The lower two contacts (ALM) are for connection to an external alarm.

To the upper right of the power block is the ground wire connection screw, and below the power block is the DIP switch control panel.

Procedure for Configuring DC Power:

During shipping, the removable green Contact Block may already be detached from the six pin terminal contact point. It may be easier to attach the DC wires to the green Contact Block if it has first been unplugged from the terminal contact point on the switch.

A. On the Power Contact Block, use a flathead screwdriver to loosen the screws reserved for primary power (labeled PWR +/-) and then insert negative and positive DC wires. Tighten until snug.

B. For the backup DC connection, follow the same procedure as above. Attach DC power wires to the Contact Block (in the position marked RPS +/-)

C. If not already inserted into the terminal block receptor into the Switch, do so now.

D. Assure your DC power supply is stable and clean before applying DC power to the Switch.

Ethernet Connections

The 314500 Industrial Fast Ethernet Switch has five 10/100Base-TX Ethernet ports.
The 10/100Base-TX ports are located on the Switch's

front panel and are used to connect to Ethernet-enabled devices.

LED Indicators

Switch Status LED

Besides LED indicators for the 10/100BaseTX ports, the Switch has following LED status indicators.

Power Indicator (PWR)

This indicator lights green when the Switch is receiving power from primary power supply. Otherwise, it is off.

Redundant Power Supply (RPS)

This indicator lights green when the Switch is receiving power from redundant power supply. Otherwise, it is off.

Alarm (ALM)

This indicator will light red and will signal an alarm (when an external alarm is connected) during a down link condition on any port and during primary or redundant power failure to the Switch.

10/100Base-TX ports

There are two eagle eye LED's on each 10/100 port. The top LED will illuminate green during 100Mbs link, and the lower LED will illuminate green during link or activity. Otherwise, the LED's will be off.

External Alarm Contact

The 314500 Industrial Switch has one Alarm Contact located on the green Power Block Contact on the top panel. For detailed instructions on how to connect the Alarm Contact power wires to the two middle contacts of the 6-contact terminal block connector, see the Connecting DC Power inputs in the section above (it is the same procedure).

You can connect the Fault circuit to any warning light which the user's factory or industry already has located in the control room or factory floor. When a fault occurs, the Switch will send a signal through the Alarm contact, to activate the external alarm or siren. The Alarm Contact has two terminals that form a Fault circuit for connecting to an alarm system.

An alarm will be signaled in the following situations:

1. Ports 1 ~5: link fail (ex: cable disconnected, device break down .....)

2. PWR/RPS: Power failure
    a. Power cord is disconnected, power supply malfunction, etc.
    b. Input power is out of the range listed in the spec (9 ~ 48V)

DIP Switch Settings

DIP Switches allow for the user to manually turn ON/OFF any port, the external Alarm, or the redundant power supply. The figure below shows the DIP switch control.

DIP 1 (PWR) controls the primary power external alarm input. Default is OFF.

DIP 2 (RPS) controls the redundant power external alarm input. Default is OFF.

DIP 3-7 represents the alarm for port numbers of the 314500 Switch respectively. Move the DIP switch to the ON position to manually enable the alarm function. Default is OFF.

DIP 8 (QoS) controls the QoS function on port 1 of the Switch. Default is ON.

✓ Recommended Procedure for configuring and setting DIP switches during initial installation:

1. Turn all DIP switches OFF.
2. Install the 314500 into your network.
3. Decide which port(s) need to be monitored or triggered alarm(s).
4. Turn the corresponding port DIP switch ON.
5. Start the switch for networking operation.

Auto-negotiation

The 314500 Industrial Switch's 10/100 Mbps switched RJ-45 port auto negotiates with the connected device for the fastest data transmission rate supported by both devices. This helps make the Switch plug-and-play device. The switch's RJ-45 ports support full or half duplex, depending on which transmission speed is supported by the attached device.

Switching, Filtering, and Forwarding

Packets entering the 314500 Switch with source and destination addresses belonging to the same port segment will be filtered, constraining those packets to one port, and relieving the rest of the network from the need to process them. A packet with destination address on another port segment will be forwarded to the appropriate port, and will not be sent to the other ports where it is not needed. Packets that are used in maintaining the operation of the network (such as the occasional multi-cast packet) are forwarded to all ports. As with all VOLKTEK switches, the 314500 Industrial Switch operates in the store-and-forward switching mode, which eliminates bad packets and enables peak performance to be achieved when there is heavy traffic on the network.

Port Speed & Duplex Mode

After plugging the selected cable to a specific port, the system uses auto-negotiation to determine the transmission mode for any new twisted-pair connection: If the attached device does not support auto-negotiation or has auto-negotiation disabled, an auto-sensing process is initiated to select the speed and set the duplex mode to half-duplex.

TECHNICAL SPECIFICATIONS

General	
Standards	IEEE 802.3 IEEE 802.3u & IEEE 802.3x
Connectors	5 (five) 10/100BaseTX RJ45
Max Distances	RJ-45 – 100 meters
Ports	5x 10/100Mbps auto-negotiation, auto MDI-X ports
Physical and Environmental	
DC inputs	9-48V DC
Temperature	Operating: 0° ~ 70° C, Storage: -20° ~ 80° C
Humidity	Operating: 10% ~ 80%

Dimensions	100 x 50 x 120 mm (D x W x H)
Compliance	FCC Class A, CE approved

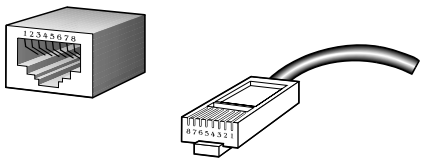
Performance	
Transmission Method:	Store and forward, with IEEE802.3x full duplex, non-blocking flow control.
Packet Filtering/Forwarding Rate:	10Mbps Ethernet: 14,880/pps 100Mbps Fast Ethernet: 148,800/pps
MAC Address Learning:	Automatically update

RJ-45 Pin Specification

For your reference, the following diagram and tables show the standard RJ-45 receptacle/connector and their pin assignments.

RJ-45 Connector pin assignment	
Contact	Media Direct Interface Signal
1	TX + (transmit)
2	TX - (transmit)
3	Rx + (receive)
4	Not used
5	Not used
6	Rx - (receive)
7	Not used
8	Not used

The standard cable, RJ-45 pin assignment



The standard RJ-45 receptacle/connector

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